(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau





(43) International Publication Date 2 May 2002 (02.05.2002)

PCT

(10) International Publication Number WO 02/034330 A3

(51) International Patent Classification7: A61N 1/36, 1/365

(21) International Application Number: PCT/US01/45698

(22) International Filing Date: 26 October 2001 (26.10.2001)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data: 60/243,393

26 October 2000 (26.10.2000) U

(71) Applicant: MEDTRONIC, INC. [US/US]; 710 Meditronic Parkway N.E., Minneapolis, MN 55432 (US).

(72) Inventors: HILL, Michael, R., S.; 3928 Washburn Avenue South, Minneapolis, MN 55304 (US). KING, Gary, W.; 1319 Hillcrest Drive Northeast, Fridley, MN 55432 (US). MULLEN, Thomas, J.; 2033 135th Lane Northeast,

Ham Lake, MN 55304 (US). **ZHOU, Xiaohong**; 17715 45th Avenue North, Plymouth, MN 55446 (US). **MEHRA, Rahul**; 4980 Neal Avenue North, Stillwater, MN 55082 (US).

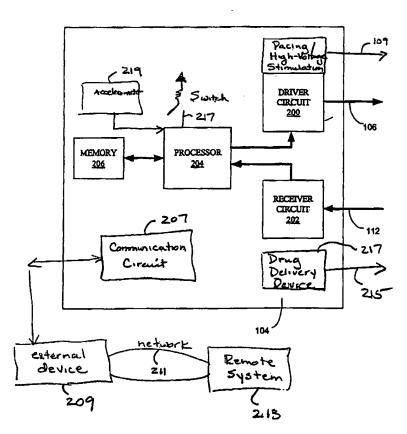
- (74) Agents: McMAHON, Beth, L. et al.; Medtronic, Inc. LC340, 710 Medtronic Parkway N.E., Minneapolis, MN 55432 (US).
- (81) Designated States (national): CA, JP.
- (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

Published:

- with international search report
- (88) Date of publication of the international search report: 30 January 2003

[Continued on next page]

(54) Title: METHOD AND APPARATUS TO MINIMIZE THE EFFECTS OF A CARDIAC INSULT



(57) Abstract: A method and apparatus are provided for protecting cardiac tissue from insult. The method comprises identifying the occurrence of an insult, such as a heart attack, and delivering electrical stimulation to one or more predetermined nerves in a patient's body in response to identifying the occurrence of the insult. The stimulation may be provided to peripheral nerves, intrinsic cardiac nerves, sympathetic ganglia, cranial nerves, and may generally be directed to the vertebral column, or within the chest wall of the patient.

WO 02/034330 A3

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

nal Application No

PCT/US 01/45698 A. CLASSIFICATION OF SUBJECT MATTER IPC 7 A61N1/36 A61N ÃĠĪN1/365 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 A61N Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the International search (name of data base and, where practical, search terms used) EPO-Internal C. DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. EP 0 688 577 A (PACESETTER AB) X 27,28, 30,32, 27 December 1995 (1995-12-27) 34,55-58 the whole document X US 6 134 470 A (HARTLAUB JEROME T) 25-28, 17 October 2000 (2000-10-17) 30,32, 34,55-58 cited in the application the whole document χ US 5 824 021 A (RISE MARK T) 25-28, 20 October 1998 (1998-10-20) 30,32, cited in the application 34,55-58 the whole document X Further documents are listed in the continuation of box C. Patent family members are listed in annex. Special categories of cited documents: "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance invention *E* earlier document but published on or after the international filling date "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) 'Y' document of particular relevance; the claimed Invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu-ments, such combination being obvious to a person skilled O document referring to an oral disclosure, use, exhibition or *P* document published prior to the international filing date but later than the priority date claimed '&' document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 5 July 2002 15/07/2002 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016

Ferrigno, A

INTERNATIONAL SEARCH REPORT

Intel nal Application No PCT/US 01/45698

		FC1/US 01/45098
	ation) DOCUMENTS CONSIDERED TO BE RELEVANT	
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 058 331 A (KING GARY W) 2 May 2000 (2000-05-02) cited in the application the whole document	25,26, 28, 30-32, 55,56,58
X	US 5 058 584 A (BOURGEOIS IVAN) 22 October 1991 (1991-10-22) cited in the application	25,26, 28,30, 32,55, 56,58
X	the whole document US 5 199 428 A (BOURGEOIS IVAN ET AL) 6 April 1993 (1993-04-06) cited in the application the whole document	25,26, 28,30, 32,55, 56,58
	210 (continuation of second sheet) (July 1992)	

International application No. PCT/US 01/45698

INTERNATIONAL SEARCH REPORT

Box i Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)						
This international Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:						
1. X Claims Nos.: 1-24, 35-54 because they relate to subject matter not required to be searched by this Authority, namely:						
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by therapy						
Claime Nos.: because they relate to parts of the international Application that do not comply with the prescribed requirements to such an extent that no meaningful international Search can be carried out, specifically:						
3. Claims Nos.: because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).						
Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)						
This international Searching Authority found multiple inventions in this international application, as follows:						
As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.						
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.						
3. As only some of the required additional search fees were timely paid by the applicant, this international Search Report covers only those claims for which fees were paid, specifically claims Nos.:						
4. No required additional search fees were timely paid by the applicant. Consequently, this international Search Report is restricted to the invention first mentioned in the claims, it is covered by claims Nos.:						
Remark on Protest The additional search fees were accompanied by the applicant's protest. No protest accompanied the payment of additional search fees.						

INTERNATIONAL SEARCH REPORT

information on patent family members

Inter nal Application No PCT/US 01/45698

Patent document dted in search report		Publication date	Patent family member(s)		Publication date
EP 0688577	A	27-12-1995	EP JP	0688577 A1 8038626 A	27-12-1995 13-02-1996
US 6134470	Α	17-10-2000	WO	0027474 A1	18-05-2000
US 5824021	A	20-10-1998	NONE		
US 6058331	A	02-05-2000	EP WO	1075307 A1 9955413 A1	14-02-2001 04-11-1999
US 5058584	A	22-10-1991	DE DE EP JP JP WO	69105140 D1 69105140 T2 0546024 A1 2929316 B2 6500715 T 9204075 A1	15-12-1994 13-04-1995 16-06-1993 03-08-1999 27-01-1994 19-03-1992
US 5199428	A	06-04-1993	AU CA DE DE DE EP JP JP WO	648167 B2 1647992 A 2076384 A1 69223703 D1 69223703 T2 69225813 D1 0530354 A1 0721786 A2 2620819 B2 6502571 T 9216257 A1	14-04-1994 21-10-1992 23-09-1992 05-02-1998 16-07-1998 09-07-1998 10-03-1993 17-07-1996 18-06-1997 24-03-1994 01-10-1992